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Elizabeth Miller
Elizabeth Miller

February 5, 2001
Date

ATTORNEY DOCKET NO. 10990641-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Peter G. Webb *et al* . Group Art Unit: 1631

Serial No.: 09/359,527 Examiner: Jeffrey S. Lundgren

Filed: 07/22/99

Title: BIOPOLYMER ARRAYS AND THEIR FABRICATION

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

AMENDMENT AND RESPONSE

Please amend the present application by canceling claims 20-45 and adding new claims 46-55. In accordance with 37 CFR 1.121(c)(3) a clean copy of all of the claims as now pending is below and their entry is requested. An APPENDIX showing all amendments to the claims (other than canceled claims 20-45) is attached at the end of the present Response.

A1

1. (AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

(a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;

(b) when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and

A1 cont'd

(c) operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array.

2. A method according to claim 1, additionally comprising operating the deposition apparatus according to the corrected drive pattern.

3. A method according to claim 1 wherein the probes are DNA or RNA probes.

4. A method according to claim 1 additionally comprising saving the target drive pattern in a memory of the deposition apparatus.

5. A method according to claim 1 additionally comprising saving the target drive pattern in a memory of the deposition apparatus, and wherein the corrected drive pattern is saved in the memory.

6. A method according to claim 1 wherein the corrected drive pattern is derived without obtaining a target drive pattern.

A2

7. (AMENDED) A method according to claim 4 wherein:

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array; and

the corrected drive pattern controls operation of the transport system.

Sub CD

8. (AMENDED) A method according to claim 1 wherein:

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one

of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the target drive pattern controls operation of the transport system; and

the operating parameter is the position of the substrate or dispensing head, which is examined by viewing the substrate or dispensing head.

A2 cont'd

9. A method according to claim 8 wherein the operating parameter is examined by viewing a fiducial mark on the dispensing head or substrate

10. A method according to claim 1 wherein:

the deposition apparatus includes a dispensing head with multiple nozzles to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the drive pattern controls operation of the transport system;

the operating parameter is the position of the substrate or dispensing head, or orientation of a nozzle, and is examined by viewing the substrate, dispensing head, or nozzle, or a droplet pattern previously dispensed from the head.

11. A method according to claim 7 additionally comprising saving the target drive pattern in a memory of the deposition apparatus, and wherein the corrected drive pattern is saved in the memory, prior to operating the dispensing head and transport system to form the array.

12. A method according to claim 7 additionally comprising saving the target drive pattern in a memory of the deposition apparatus, and wherein the corrected drive pattern is derived by modifying, based on the detected error, instructions to at least one deposition apparatus component based on the target drive pattern during operation of the dispensing head and transport system to form the array.

13. A method according to claim 1 wherein the at least one parameter is the position of the substrate in the deposition apparatus.

14. A method according to claim 7 wherein the at least one parameter is a position of the dispensing head.

A3 Sub B1

15. (AMENDED) A method according to claim 7 wherein the deposition apparatus further includes a position encoder to detect the position of the dispensing head or the substrate, and wherein the at least one parameter is an accuracy of the encoder.

Sub B2

16. A method according to claim 7 wherein the at least one parameter is the accuracy in an ability of the transport system to move the substrate to an expected location in response to a command.

Sub B5

17. A method according to claim 7 wherein the dispensing head has multiple droplet dispensing nozzles, and wherein the at least one parameter is a position of a nozzle.

A4

18. (AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus and which is stored in a memory of the deposition apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

when an error from a nominal value exists in at least one operating parameter, which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited then deriving, based on the error, a corrected drive pattern from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and

operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array. .

19. A method according to claim 18 wherein the corrected drive pattern is saved in the memory.

A5 SUB B3

46. (NEW) A method according to claim 1 wherein:

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the drive pattern controls operation of the transport system; and

the at least one parameter is an accuracy in an ability of the transport system to move the substrate or head to an expected location in response to a command.

47. (NEW) A method according to claim 46 wherein the at least one operating parameter is a deviation of actual movement of the substrate or head from a corresponding nominal axis of movement.

48. (NEW) A method according to claim 46 wherein the at least one operating parameter is an accuracy in an ability of the transport system to move the substrate to an expected location in response to a command.

SUB C6

49. (NEW) A method according to claim 1 wherein the operating parameter is a fluid volume dispensed by the deposition apparatus.

SUB B4

50. (NEW) A method according to claim 1 wherein the operating parameter is an effect of thermal expansion.

51. (NEW) A method according to claim 1 wherein:

SUB C8

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the apparatus further includes an encoder to provide data on the location of the substrate or head; and

the at least one operating parameter is an encoder error.

52. (NEW) A method according to claim 1 wherein:

the deposition apparatus includes a dispensing head with multiple nozzles to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the drive pattern controls operation of the transport system;

the operating parameter is the position of the dispensing head, or orientation of a nozzle, and is examined by viewing the dispensing head, or nozzle.

53. (NEW) A method according to claim 1 wherein the position is a dynamic position.

54. (NEW) A method according to claim 14 wherein the position is a dynamic position.

55. (NEW) A method according to claim 49 wherein the deposition apparatus comprises multiple jets for dispensing droplets, and wherein the corrected drive pattern comprises an instruction to switch to a different jet when a deviation from nominal volume is encountered for one jet which is more than a predetermined tolerance.

Remarks

The Examiner is thanked for the Office Action dated 10/04/01 (request for a 1-month extension to respond, enclosed).

The election of Group I (claims 1-20) is confirmed, without traverse. In making this election Applicant notes that for the basis of the restriction requirement